



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,321	04/19/2006	Kazunari Kurita	12054-0059	9391
22902	7590	12/18/2007		
CLARK & BRODY 1090 VERMONT AVENUE, NW SUITE 250 WASHINGTON, DC 20005			EXAMINER CHAET, MARISSA W	
			ART UNIT 1791	PAPER NUMBER
			MAIL DATE 12/18/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,321	KURITA ET AL.	
	Examiner	Art Unit	
	Marissa W. Chaet	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2007.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

1. **Claims 1-2, 5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 7-12, 17 of copending Application No. 10/512,405.** Although the conflicting claims are not identical, they are not patentably distinct from each other. Claim 7-12 and 17 of '405 include a method of producing a high-resistance silicon wafer having a resistivity of 100 Ωcm or more, oxygen concentration of 14×10^{17} atoms/ cm^3 or more, carbon concentration of 0.5×10^{16} atoms/ cm^3 or more, remaining oxygen concentration of 12×10^{17} atoms/ cm^3 or less by performing heat treatment performed at 700-900°C for 5 hours or more, a heat treatment performed at 950-1050°C for 10 hours or more, a heat treatment performed at 1100-1250°C for 1-5 hours, and a density of a grown-in defect of $1 \times 10^3 / \text{cm}^3$. Claims 1-2 and 5 of instant application include a method of producing a high-resistance silicon wafer having a resistivity of 100 Ωcm or more, oxygen concentration of 13×10^{17} atoms/ cm^3 or more, carbon concentration of 5×10^{15} - 5×10^{17} atoms/ cm^3 , remaining oxygen concentration of 6.5×10^{17} - 13×10^{17} atoms/ cm^3 by performing heat treatment performed at 700-900°C for 5 hours or more, a heat treatment performed at 850-1000°C for 0.5-5 hours employing a heat-up of 0.5°C - 10°C/minute, a heat treatment performed at 1150°C or above for 1-2 hours, and lowering the temperature to 1000-1150°C for 2-10 hours.

Art Unit: 1791

Falster et al. (US 2003/0008435) discloses a heat-up rate of about 5°C - 30°C/minute. See para. 53. Thus, it would have been obvious to one of ordinary skill at the time of the invention to include a grown-in defect amount to prevent contamination and to employ a heat-up rate of about 0.5°C - 10°C/minute to quickly increase the temperature.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

2. **Claims 1-2, 5-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5-8, 10 of copending Application No. 10/519,837.** Although the conflicting claims are not identical, they are not patentably distinct from each other. Claims 1, 5-8, and 10 include a high-resistance silicon wafer having resistivity of 100 Σ cm or more, oxygen concentration of 8×10^{17} atoms/cm³ or more, carbon concentration of 5×10^{15} - 5×10^{17} atoms/cm³, remaining oxygen concentration of 6.5×10^{17} atoms/cm³ or more, a heat treatment at 1000°C or higher, an epitaxial wafer, and a SOI wafer which is a bonded or SIMOX wafer. Claims 1-2 of the instant application include a method of producing a high-resistance silicon wafer having a resistivity of 100 Ω cm or more, oxygen concentration of 13×10^{17} atoms/cm³ or more, carbon concentration of 5×10^{15} - 5×10^{17} atoms/cm³, remaining oxygen concentration of 6.5×10^{17} - 13×10^{17} atoms/cm³ by performing heat treatment performed at 700-900°C for 5 hours or more, a heat treatment performed at 850-1000°C for 0.5-5 hours employing a heat-up of 0.5°C - 10°C/minute, a heat treatment performed at 1150°C or above for 1-2 hours, and

Art Unit: 1791

lowering the temperature to 1000-1150°C for 2-10 hours. Claims 5-8 of the instant application include an epitaxial wafer, and a SOI wafer which is a bonded or SIMOX wafer.

Falster et al. (US 2003/0008435) discloses a heat-up rate of about 5°C - 30°C/minute. See para. 53. Thus, it would have been obvious to one of ordinary skill at the time of the invention to include a grown-in defect amount to prevent contamination and to employ a heat-up rate of about 0.5°C - 10°C/minute to quickly increase the temperature.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Falster et al. (US 2003/0008435) in view of Sadamitsu et al. (US 2005/0250349).

2. Regarding claim 1, Falster discloses a process for producing silicon wafers wherein it comprises subjecting silicon wafers obtained by the Czochralski method and having a resistivity of about 10 Ωcm, an initial oxygen concentration of about 5×10^{17} - 9×10^{17} atoms/cm³ and a carbon concentration of less than 5×10^{16} atoms/cm³ to first

Art Unit: 1791

heat treatment temperature of about 850°C for about 1 hour employing a heat-up rate of about 5°C - 30°C/minute; and second heat treatment temperature from about 1100-1400°C for about 0.1-12 hours; followed by subsequent lowering of the temperature and heat treating at about 1050°C for at least about 5 hours. See para. 48, 52-53, 67-72, 94, 102-104, 108, 115, 122, 127. Falster discloses a resistivity of 10 Ωcm, however Sadamitsu discloses a process where the resistivity can be increased to 100 Ωcm. See para. 15. Thus, it would have been obvious to one of ordinary skill at the time of the invention to increase the resistivity to 100 Ωcm, such as suggested by Sadamitsu, to reduce the amount of carbon needed for preventing the generation of oxygen thermal donor.

3. Regarding claim 2, Falster discloses an initial oxygen concentration of greater than 8×10^{17} atoms/cm³ and heat treatment and second heat treatment temperature from about 1100-1400°C for about 0.1-12 hours. See para. 67, 104, 127.

4. Regarding claim 3, Falster discloses first and second heat treatments carried out in a non-oxidizing atmosphere. See para. 85.

5. Regarding claims 4-5, Falster does not disclose oxygen donors. However, Sadamitsu discloses silicon wafers subjected to heat treatment where the amount of oxygen donors generated within the wafers of 10^{14} atoms/cm³ or less and where the residual oxygen concentration is 6.5×10^{17} atoms/cm³ or above. See para. 19, 25.

Thus, it would have been obvious to one of ordinary skill at the time of the invention to include the concentration of oxygen donors, such as suggested by Sadamitsu, to prevent reduction of the resistivity of the wafer.

Art Unit: 1791

6. Regarding claim 6, Falster discloses a method of producing epitaxial wafers wherein an epitaxial layer formed on the surface of the silicon wafers. See abstract.

7. Regarding claim 7, Falster discloses a method of producing SOI wafers wherein SIMOX type SOI wafers are produced using silicon wafers. See para. 126-127.

Regarding claim 8, Falster discloses SIMOX type, but not bond type SOI wafers.

However, Sadamitsu discloses bond type SOI wafers. See para. 14, 34. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide bond type SOI wafers, such as suggested by Sadamitsu, to prevent the generation of the oxygen donor.

Response to Arguments

Applicant's arguments filed October 26, 2007 have been fully considered but they are not persuasive.

Regarding the obviousness-type double patenting rejections, Applicant argued that the cited applications do not disclose a heat-up rate of 0.5-10°C/minute. However, it would be obvious within the skill in the art, as disclosed in Falster.

Regarding the 35 USC 103 rejection, Applicant argued that both prior art references are insufficient as because of priority dates. However, the filing date of Falster (2003/0008435) is June 21, 2002, and the publication date is January 9, 2003. The filing date of Sadamitsu (2005/0250349) is June 30, 2003, and the publication date is November 10, 2005. Examiner agrees that Applicant's priority date is October 20, 2003. Therefore, both Falster and Sadamitsu have valid filing dates that support a 35 USC 103 rejection.

Art Unit: 1791

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa W. Chaet whose telephone number is 571-272-8094. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra N. Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1791

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MWC
December 11, 2007

*/Robert Kunemund/
Robert Kunemund
Primary Examiner
TC 1700*